

INDIVIDUAL RESEARCH STUDY

COAST DEFENSE OPERATIONS

AT

OSTENDE AND ZEEBRUGGE

DURING

THE WORLD WAR

by

Lieutenant Colonel Rollin L. Tilton,
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Class of 1933-35.
Command and General Staff School.

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COAST DEFENSE OPERATIONS
AT OSTENDE AND ZEEBRUGGE DURING THE WORLD WAR.

GENERAL

The coast defense operations at Ostende and Zeebrugge during the World War extended over practically the entire period of the war. As soon as the Germans occupied the Belgian coast, from the Dutch border to Nieuport, in October 1914 they initiated measures of coast defense which made the entire sector into one great fortified area. Throughout the war these defenses securely protected the important harbors and submarine bases of Ostende and Zeebrugge and the right flank of the German Army on the Western front. The operations against them, carried out almost entirely by the British Navy, include in one form or another nearly all types of coastal action. Never seriously threatened, they fell only on the withdrawal of the Germans from Flanders in 1918 because of pressure in other areas.

German occupation of the Belgian Coast.

After the battle of the Marne, the Germans checked the Allied pursuit along the Aisne. There then began, about the middle of September 1914, the race to the sea and for the vital channel ports. At the time a large part of the Belgian army was before the fortifications of Antwerp and initially,

because of the vital importance of the channel ports to the British, efforts were made to assist this force and block entirely the German advance to the coast. These efforts failed and the Belgian and the Allied forces which had been sent to their assistance were forced back toward the sea and to the west. Antwerp was evacuated and capitulated October 10, the Allied forces falling back to the line of the Yser River, (Chart B.), extending south from the sea at Nieuport. The movement was completed by October 15 and Ostende, Zeebrugge and the coast were occupied by the Germans at the same time. Believing it would be possible to re-occupy the coast and these ports they were left intact. (1)

On October 15, the Belgians occupied the line: Yser canal, south of Dixmude - Yser River to Nieuport, with some Allied units and with advanced posts on the east bank. (2) On October 16, General Jeffre having requested the assistance of British naval forces in the coastal operations, Admiral Hood, commanding the Dover Patrol, the force protecting the straits, was sent over with a miscellaneous force to cooperate. The Germans advanced from Ostende on Nieuport attacking, on October 18, with their main effort toward Nieuport. The attack was continued until October 22 when it halted: it had failed along the coast but had succeeded farther south where the Germans secured a bridgehead over the Yser at Tervaete some seven miles inland. During this attack the defense was closely supported by the naval forces along the coast which kept up a heavy fire on the shore. (3)

Note: The name of the author only is given in the foot notes containing reference to the works of individuals. Other sources are designated by abbreviations, full title is in bibliography.

(1) BNO I-223

(2) Ibid.

(3) BNO I-228-234.

On October 24, so striking had been the success on the sea flank, an Allied counter-offensive employing French troops was attempted up the coast to recover Ostende. Closely supported by the naval forces the attack jumped off: it met with success on the coast but failed owing to a renewed German attack to the south exploiting their bridgehead near Tervaele. As a result, the Belgian line was pushed back to the line of the Nieuport-Dixmude railroad where with the assistance of flooding operations the German advance was finally stopped. By November 2, the flooding operations caused the Germans to fall back to the east bank of the Yser where the line remained. (4)

It seems apparent that the initial German effort along the coast failed because of the naval support given the defense and that the initial success on the coast of the counter-offensive was largely due to naval support. At first the Germans had no artillery present capable of dealing with ships, by October 20, several heavy batteries appeared near Westende and one British destroyer was put out of action. During the second phase of the operations; the ^{re}enplacement of additional artillery, the appearance of German submarines, and weather conditions, made naval support increasingly difficult.

(4) BNO-I-235-244.

Reasons for Defense.

The Germans having secured the Belgian Coast as far as Nieuport the naval and military reasons for its retention and close defense are at once apparent.

The Germans naval forces had their principal bases in the Heligoland Bight. (5) (Chart A.) At a bound Germany had found in the Bruges-Ostende-Zeebrugge triangle an invaluable and protected naval base for submarines and small craft some three hundred miles nearer, and practically on, the Straits of Dover. In all of Britain's European wars the Straits and the southern part of the North Sea that fringes the Belgian coast have been areas of considerable strategic importance. They are the narrowest part, some twenty miles across, of the belt of water protecting England from invasion and have always constituted the bottleneck of the food supply of London and the main routes of overseas commerce. Roughly one hundred ships a day passed Dover during the war. (6)

From Dover and Folkestone on the English coast to Dunkerque, Calais and Boulogne on the French coast were the lines of communication of the British Expeditionary Force. (7) Across here daily passed a constant flow of personnel and supply. From Heligoland to Dover is three hundred and fifteen miles; from Ostend, Dover is but

(5) Frost-53 Scheer-21.

(6) Bacon-40

(7) Bacon-40 and 89.

sixty, Dunkerque twenty-three and Calais fifty. Submarine operations against the channel traffic and the trans Atlantic trade routes was greatly facilitated. Light forces found on the Belgian coast an advanced base for raids and operations against the channel traffic, British naval forces in the southern waters of the North Sea, and the English and French coasts. As a base for air operations the coast by reason of its advanced position was invaluable.

The military reasons for the defense of the Belgian coast were equally important. It had become the right flank of the German line on the Western front, its defense was vital to the safety of the army. Recent operations had demonstrated that that line was enfiladed from the sea and if not adequately defended, a source of weakness. British superiority at sea made offensive operations along the coast or joint landing operations with a view to turning the German flank a strong possibility. Lastly, the German occupation of the Belgian coast in dangerous proximity to British vital communications, military and economic, as well as the threat of invasion it held toward England, demanded its close defense if it was to be retained.

The German Admiralty fully appreciated that the use of Flanders as a base for naval warfare gave them a substantial improvement in their strategic position.(8) Before the end of October 1914, the Antwerp yards were

(8) Von Tirpitz- 11-23.

in operation and small submarines assembled. Ostende, Zeebrugge and Bruges became effective bases by the end of November.(9) The U Boat flotilla of the Naval Corps in Flanders was established March 15, 1913. It operated as many as 37 U Boats at one time and up to April 1918 was responsible for 23% of the total results of the U Boat campaign. In addition to the U Boats some 25 to 35 destroyers and Torpedo boats as well as smaller craft were based on the coast from which they conducted operations in the channel.(10)

Belgian Coast.

The Belgian coast from the Dutch to the French borders is only forty miles long. (Chart B.) The part occupied and defended by the German from the Dutch border to Nieuport was thirty miles.

The coast consists mainly of flat country barely elevated above sea level cut up by a network of canals and small rivers. A line of sand dunes runs parallel to and within a few hundred yards of the shore, interrupted only by the towns and canal entrances. These dunes which formed an enormous rampart along the coast were about twelve yards high and varied in width from seventy-five to one thousand yards. Back of the dunes the country is very flat and sparsely settled between towns. Few trees and nothing that could be called a

(9) ZO 11-12.

(10) Carpenter -11. Scheer -340,346.

wood is to be found near shore.(11) Aside from the canal system, which will be referred to later, the Yser river flowing generally north from Ypres and emptying into the North Sea at Nieuport was the only stream of importance. The road net was excellent and the rail net ample.

The coastal waters are beset with shoals reaching for some eight miles to seaward. There is a tidal range of some fifteen feet along the coast and strong tidal currents which cause a constant shifting of the bottom making navigation difficult and hazardous particularly in time of war when the aids to navigation cannot be depended on.(12)

Eastward of Nieuport there are three harbors, Ostende, Blankenberghe and Zeebrugge, while some eight miles inland from Zeebrugge is Bruges connected by canals with both Ostende and Zeebrugge. All are artificial harbors. Ostende, Zeebrugge-Bruges thus formed a triangle with two sea entrances some twelve miles apart. Ostende and Zeebrugge were ports of considerable importance before the war (Chart B.) provided with numerous wharves, basins and docks and suitable for submarines and torpedo craft of all classes. Bruges was an entirely artificial harbor consisting of locks, basins and waterways built on the canal system. In addition to its canal connections with Ostende and Zeebrugge it was also connected by canal with

(11) Norton 371.

(12) Carpenter 8.

Antwerp via Ghent. The Bruges-Zeebrugge canal was the largest and most important, six and a quarter miles long, almost straight and capable of accommodating submarines and destroyers of the largest size. The Ostende canal was narrow, tortuous and shallow and could not be used for such large ships.

Bruges by reason of its inland position and facilities was used as the main German base. Zeebrugge because of the canal connection, its more difficult approaches, and protecting mole, making it more difficult to attack, was used as the main sea base. At both these ports the Germans located shelter for protecting submarines from aerial attack, docks, repair shops, stores and ammunition. Ostende was used as a subsidiary base. At both Zeebrugge and Ostende were located seaplane bases. Blankenberghe being unconnected with canal systems was used for small craft only. (13)

(13) Carpenter 9-12. 20. 11.

COAST DEFENSE.

German Naval Corps.

The defense of the Belgian coast was the responsibility of the German Naval Corps. This was a special corps organized by the German Admiralty from their marine infantry battalions and naval gunners drawn from various forts and garrisons and reinforced by certain army units. (14) Elements of this corps first appeared in the taking of Antwerp, October 10, 1914; it occupied the coast soon thereafter and remained there until the final evacuation of Flanders in 1918. (15)

The Naval Corps, as first organized, consisted of two divisions, the corps troops, and the naval forces operating from the Flanders bases. Its organization as it existed in March 1915 and which may be taken as typical is shown in Table IA. In April 1917, the 3rd Naval Division was formed from the Marine Infantry Brigade and the 1st, 2nd and 3rd Marine Infantry Regiments. (Table IB.) This division was employed not only on the coast but in other sectors. (16)

The Corps mission was the sea and land defense of the coast and for this it was responsible to the Army Command. However, the assignment to this Corps of the U Boat and torpedo boat flotilla gave it also a distinctly naval and offensive mission. (17)

The Naval Corps was commanded by Admiral Von Schroder who had his command post in Bruges. (18) It occupied the

(14) Scher 345. Von Tirpitz II 79-80.

(15) " HGD. 85.

(16) GF. 203.

(17) Scher 339, 345. Von Tirpitz II 79-80.

(18) " 345. GF. 202.

sea front and coast sector in occupied Belgium. The 1st Division occupied the coast from the Dutch border to Raversyde and the 2nd Division the sea front from Raversyde to the land front and that front to Schoorbakke. The two divisions occupied these fronts permanently and the Marine and Matrosen infantry regiments alternated between the two sectors.(19) The dispositions of the principal elements of the corps as of March 15, 1915 are shown in Chart C. They appear to have varied little throughout the war.

Harbor Defenses.

The harbor defense personnel was furnished from the Matrosen Artillery Regiments, which were coast artillery troops, and certain other units of the Naval Corps.(20)

The harbor defenses were first developed with a view to providing, with the least delay, effective harbor defense for Ostende and Zeebrugge. The construction of the coast batteries commenced shortly after the occupation of the coast and was continued up to 1918 by which time they had become so extensive as to form a complete seaward defense for the entire coast.(21)

The principal batteries of the defense were as shown in Table II. Their locations and fields of fire are shown in Chart B. All together there were 37 guns of the primary armament (280 mm or greater) and 70 guns of the secondary armament.

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- (19) HGD 49, GF 202.
(20) KNS 4- 484.
(21) Norton 366-87.

The primary armament was all well back from the coast in widely scattered positions, some 500-2000 yards from the shore; spotting on the shore as a reference was consequently impossible in firing on these batteries. Of the secondary armament, a few of the larger batteries were back from the shore but the majority were located in the line of dunes or on the shore. Many of the guns were emplaced for indirect fire only, nearly all were emplaced to secure their maximum range and for all round fire.

Emplacements were of concrete but of varying design. Some of the batteries were arranged with guns in line equally spaced with parapets, traverses and parapets; others, particularly the later railway batteries, were installed with the guns at the corners of a quadrilateral, so arranged that the battery could not be enfiladed. Nearly all guns had shields or were in turrets. Magazines, fire control stations and quarters were massive and well constructed. Broad and narrow gauge railways were so used that it was possible to supply any battery with ammunition by rail from dumps well to the rear. All installations were well camouflaged and extensive arrangements made for the use of smoke. (22)

The coast batteries were apparently organized into two groupments, Ostende and Zeebrugge, under the Artillery Commander of the North Sea whose command post was at Ostende. The Ostende groupment was divided into two groups, a North and a South group each under a separate Battle Commander.

(22) Bacon 110,281. Norton 371-377. MA. BNO V Chart 19.

The general boundary between these groups was Ostende and the Bruges canal. The Zeebrugge groupment was, probably, under a single Battle commander but the dispositions of ~~this~~ armament would indicate that there were possibly, as at Ostende, two. (23)

Antiaircraft Defense.

The antiaircraft defense of the sector was strong. There were numerous batteries of antiaircraft guns usually located back from the shore except on the Zeebrugge Mole where there was a battery. Antiaircraft machine guns were located close to the coast batteries, practically all the batteries having at least 2 antiaircraft machine gun positions, usually on the flanks. British reports indicate that the German Antiaircraft fire was very accurate and that the guns were kept constantly manned whenever there was any air or naval activity. (24)

Beach Defense.

The beach defense covered the entire coast from Nieuport to the Dutch border in an unbroken line, closely interwoven with the harbor and antiaircraft defenses. (25)

The land, or beach defense, artillery was, for the smaller calibers, well forward and in front of the line of dunes. In the area Westende-Middelkerke there were some 120 guns hidden in the sand dunes. This position, forming in itself a formidable earthwork, served the double purpose of protecting the left of the coast defenses and the right of the northern flank of the army. Along the remainder of the

(23) Schultz 576-577.
(24) Norton 370
(25) Scheer 339.

coast were numerous batteries, all disposed to sweep the beaches and approaches and protect from attack from flank or rear. All types of armament were employed; modern field guns, semi mobile guns, fixed guns in the open and in turrets, and old guns of limited value. (26)

The infantry positions covered the beaches with an almost continuous line of trenches along the entire coast. Additional works practically encircled each separate battery or group of batteries and protected their approaches. The machine gun positions on the beach covered all approaches, the harbors, canal entrances and batteries. There was, apparently about one machine gun position of two or more guns for every thousand yards of beach, stronger in and around the harbors. In addition, there were the machine gun nests protecting the batteries and approaches inland. (27) Some of these positions are shown on the charts of Ostende and Zeebrugge harbors, Charts D and E.

The dispositions of the principal combat elements of the Naval Corps, Chart C, show that they were all disposed well forward for the positive defense of the coastal sector at the waters edge.

(26) MA. Norton 17,372. Bacon 184.

(27) MA. Norton 372. BNO V. Chart 19,246.

OPERATIONS.

The operations conducted, or planned, against Ostende Zeebrugge and the Belgian Coast fall into three general classes, namely:

Bombardments,

Landing operations, planned never executed,

Blocking attacks.

Air operations conducted in connection with the operations on the Belgian coast have not been included in this discussion nor have the purely naval operations conducted off the coast. Both are separate subjects, beyond the scope of this paper.

Air force and aviation was employed by both sides more and more as the war went on. Observation aviation was developed from a most unsatisfactory auxiliary to a high state of efficiency particularly in the spotting of long range artillery fire. Bombardment and fighter was used extensively. However, it would appear to have had no decisive effect on any of the operations nor on the final outcome.

Naval operations, off the coast, were constant and they had an indirect effect on the harbor defenses in that they were kept constantly on the alert in support. On one occasion, April 24, 1916, in supporting a German destroyer attack on some British destroyers the coast batteries disabled one and damaged three others. (28)

(28) Bacon 140.

BOMBARDMENTS.

Attacking Force.

Bombardments of the defenses and activities on the Belgian Coast were undertaken by the Dover Patrol. This was a British naval force based on Dover. It was commanded by Rear Admiral Horace Hood up to April 1915, Admiral R.H. Bacon up to the end of 1917 and finally Rear Admiral R.J.B. Keyes. It had a great variety of missions in addition to the main one of protecting the Straits of Dover and the Channel traffic. One of these was to damage or destroy the enemy organization along the Belgian coast. It was composed of a great number of classes of ships, largely old or improvised units of limited power and action.(29) The principal ships of this force employed on the coast were as shown in Table III.

Bombardments

Reference has been made to the original naval operations along the coast in connection with the German advance in 1914. Late in November of that year the first bombardments were carried out as a measure of assistance to the army west of Nieuport. The results obtained did not justify the heavy expenditure of ammunition involved and they were discontinued until more suitable ships could be obtained.(30)

(29) Frost 87. Bacon 29, 53-58, BNO I. 99.

(30) BNO II. 202.

The first monitors designed for coastal work became available in 1915 and the first serious bombardments were undertaken in August. They were conducted with two main objectives, first, the damage or destruction of the German bases at Ostende and Zeebrugge and the armament, and secondly, as a diversion or threat on the coast to draw reserves to the north when Allied offensive operations were in progress to the south, on the Western front.

The details of the principal bombardments are shown in Table IV.

In August 1916, the methodical bombardments, conducted as separate operations, had proved themselves impracticable. Admiral Bacon then assigned one or more large monitors to the forces which kept the coastal mine barrage under patrol and detailed them to bombard, whenever conditions of wind and weather made it possible. On several occasions this was done and once at least the bombardment was accurate enough to oblige the Germans to cover Ostende with smoke. On June 9, 1918 a bombardment of the Zeebrugge locks caused some temporary damage.(31)

In addition to the naval bombardments, the Dover patrol and the French had numerous heavy batteries in their coastal sector generally in the area Ramscappelle-Adinkerke. They were employed constantly for counterbattery and destructive purposes.(32)

Comments.

The bombardments are interesting as examples of careful planning and methodical execution and also as showing the

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{31} Bacon 111. BNO V. 119,275.

{32} Bacon 237-40,262.

futility of this form of attack against coast objectives and the difficulties to the navy.

The first bombardments, up to March 1915, require no special comment. During the French operation along the coast in 1914, Admiral Hoods ships were constantly called on to assist, they gave great assistance particularly at first but they suffered considerably and could not meet all the demands. The Admiraltys reaction is well summed up in the following message sent to Sir John French in December 1914:- "We are receiving requests almost daily from the French for naval support on the Belgian coast. We regret inability to comply. The small vessels alone cannot face the shore batteries, and to expose battleships to submarine risk except when in support of a land attack of first importance is unjustifiable."(33)

The objectives chosen for the major bombardments were the locks and harbor of Zeebrugge and the dockyard and harbor of Ostende. These were the two key points on the coast and it was Admiral Bacon's plan to destroy these ports by prolonged and methodical bombardments.(34) The German batteries themselves were secondary targets for as Admiral Bacon pointed out ships should never fire at shore batteries of equal or superior fire except for special reasons. The relative size of the targets and technical considerations make the probabilities against the ship.(35)

(33) BMO 1915. 1-17.

(34) BNO V. 119.

(35) Bacon 286.

Preparations for the major bombardments were undertaken early in 1915. A replica of the offing of Zeebrugge was laid out in the Thames with buoys and shapes to represent the salient features ashore and all the details were rehearsed in a long period of training and experimental firing.(36) Observation was vital. Air spotting was tried but failed, at the moment, due to communication difficulties. The next attempt was the construction of two tripods of railroad iron with small platforms for observers.(37) These tripods were planted by attendant ships some 10,000 yards from shore, their positions fixed and bilateral observation employed. They were used in the first bombardment but were at once fired on the German batteries and never recovered. It was evident that this method would not work.(38) Beginning in January 1916, combination air and terrestrial spotting from stations near Nieuport was used, found successful, and employed. Analysis of the results of each shoot eliminated errors as noted.(39)

The execution of each bombardment required a considerable operation. Bombarding ships are peculiarly exposed to attack. The presence of German submarines and the possible appearance of raiding forces made it necessary to protect the monitors with covering forces of cruisers and destroyers, to sweep the water area for mines and to give a close in defense to each firing ship. Additional ships to cover the monitors with a smoke screen as a protection from the German batteries

(36) Bacon 259.

(37) " 99.

(38) Frost 68.

(39) Bacon 104.

was vital. Consequently, many ships besides the firing ships themselves were always necessary. Protection from the air was necessary. After all preparations were made weather conditions frequently interfered and a rearrangement was necessary.

The German defense was most active. On account of the rapidity with which the batteries found the range and attacked the monitors the bombardments were of necessity conducted at long ranges, 17500 to 25000 yards and under a smoke screen, for one hit on an unprotected monitor would have been sufficient to sink her.(40) Smoke was used to obscure the targets and batteries.(41) Air forces and antiaircraft artillery attacked the spotting planes, their escorts and even the ships.(42)

The results of the bombardments were small. The first bombardments were apparently complete failures so far as material results were concerned and resulted in more damage to the ships than the shore. The most elaborate operation of all, that of May 12, 1916 against the Zeebrugge locks was a complete failure-the locks were untouched. That of June 5, against Ostende resulted in considerable damage in the dockyard and together with the bombardments which followed probably resulted in its more or less complete disuse as a base, for repair and dockyard work.

Fire on the German batteries was ineffective and there is no evidence that a single gun was ever put out of action.

(40) Jellico 203.

(41) Bacon 256. Norton 388.

(42) " 108,259.

Battery Tirpitz was one of the principal battery targets, the emplacements were surrounded by shell holes but no material damage was done.(43)

Admiral Bacon states that the bombardments ended for want of places to bombard, that they had obliged the enemy to abandon the use of Ostende as a harbor and practically limited his use of Zeebrugge as a base and driven his vessels up to Bruges.(44)

Admiral Jellicoe says that neither Zeebrugge-Ostende or Bruges could be rendered untenable to the enemy with the guns available during 1917, although Ostende in particular and Zeebrugge to a lesser extent could be and frequently were brought under fire when certain conditions prevailed and some temporary damage caused. Fire against Ostende was so effective that the harbor fell into disuse toward the end of 1917.(45)

Admiral Scheer, the commander of the German fleet, says that the bombardments had not once succeeded in inflicting serious damage.(46) That his judgement is correct is evidenced by two facts: first, that German submarine and destroyer operations were carried out from Ostende and Zeebrugge without serious interruption up to their evacuation in October 1918 and second, that the blocking attacks on Ostende and Zeebrugge in April and May 1918 were admittedly based on the failure of the bombardments to accomplish results.(47)

(43) Norton 387.

(44) Bacon 111.

(45) Jellicoe 198.

(46) Scheer 339.

(47) BNO V. 274-5.

LANDING OPERATIONS.

No land or landing operations were ever actually attempted by the Allies against the Belgian Coast. Because of the serious threat of this position against British vital communications, the British Admiralty had frequently invited attention to the fact that while naval and air operations alone could cause the enemy annoyance and inconvenience, permanent results could be secured only by land or a combined land and naval attack. While this was undoubtedly appreciated by Sir John French and Sir Douglas Haig, the conflicting demand of the Allies and the preoccupations of the British army elsewhere as well as the known strength of the coast defense all combined to prevent any such operation.(48) Several were suggested or planned and one initiated but never executed.

In the late fall of 1914, the British Admiralty proposed a joint operation up the Belgian coast to recover Ostende and Zeebrugge. The advantages to the British army and navy were beyond doubt, and suggestion was made to the French government that the British army be shifted to the left to operate with the Belgians for this purpose. The plan was, however, never carried past its initial stage, because of French disapproval, the requirements of operations further south, and finally, the genesis of the Dardanelles affair.(49)

(48) Jellicoe 198. Bacon 294. BNO V. 36.

(49) BNO II 54-55, 63-66, 88. BMO 1915-I-15.

Bacon's Plan 1915.

In the fall of 1915 Admiral Bacon devised a plan to force the entrance to Ostende Harbor by main force. At that time the British had just discovered Battery Tirpitz and their monitors being outranged, bombardment was, for the moment, no longer practicable.

Admiral Bacon¹ proposed a surprise attack on Ostende with his monitors and an army division, supported by two additional divisions transported in steamers. It was planned to use six large monitors each carrying 300 troops and 90 trawlers each carrying 100 men. The monitors were to carry extra guns and machine guns on their spar decks, armored cars and extra supplies for the division.

On the prescribed day the attacking force was to rendezvous off the English coast, proceed to Ostende and assisted by other naval forces, and undercover of an elaborately prepared smoke screen, force the harbor entrance at 7:00 A.M. and land alongside the docks at Ostende. The monitors were then to take under fire the batteries and town, covering the landing of troops and of the troops in the trawlers which were to follow. By 7:45 it was expected that the first division would be ashore. They were to storm and capture the town, seize the batteries, push southward and gain as much ground as possible. The two additional divisions were to enter the harbor by 9:30 and 11:30 respectively, reinforce the first division, and push southward.

In the meanwhile, the army on the Nieuport front was to attack and connect up with the Ostende force.(50)

The plan was considered a long time but was finally disapproved by the army and navy as impracticable. The army considered it an extremely difficult operation and the completion of the Battery Kaiser Wilhelm II near Knoeke which covered Ostende convinced Admiral Bacon that the attack could not succeed.(51)

Plan of 1917.

At the end of 1916 plans were discussed by Sir Douglas Haig and Admiral Bacon for a joint operation on the Belgian coast.(52) In May 1917 the Flanders offensive was finally decided on and a landing on the coast between Middelkerke and Westende included in the operation.

The general plan for the offensive called for a British thrust from Ypres eastward and northward, (Chart C.) to secure general area Gheluvelt - Passchendaele - Stadenberg - Clercken, the French and Belgian forces north of the British cooperating. If gained with reasonable celerity, the British would develop the thrust in the direction Roulers and Bruges. To complete the action, the Belgians were to attack from Dixmude and the British forces sent to the coastal section of the line was to attack along the coast from

(50) Frost 76-77.

(51) Bacon 294. Frost 77.

(52) " 184.

the bridgehead at Nieuport. As a part of the last operation, the landing was to be made. This operation was a special feature of the plan and was not to be undertaken until the British reached Roulers. (53)

The plans for the landing operations were carried out in the greatest secrecy and down to the last detail.

The shore from Ostende to Westende is protected by a sloping sea wall with a broad walk on top. The water to seaward is shallow, the shore for some two hundred yards out becoming dry at low tide. The problem was to land a large force quickly: to do this, a pier is the quickest method. Big ships could not be brought in but the monitors, which drew only 14 feet, could. Why not push the pier with them and beach it? After a most elaborate aerial and submarine survey of the area, three points were selected for the landing. It was found that the monitors at high tide could get to within 550 feet of shore. One pontoon 550 feet long and 30 feet wide, drawing only 18 inches at the bow and with a capacity of about 2500 tons, was accordingly built and tried out secretly with two monitors pushing it. After the details of handling it were perfected the other two were built. They were to be pushed in before the monitors, beached at the selected points and, covered by the ships guns, the landing effected.

The plan having progressed so far, the monitors, pontoons and necessary auxiliaries were sent to the entrance

(53) Dewar I 362. Bacon 184.
364.

of the Thames out of sight of habitation and quarantined. At night or in cloudy weather the crews were trained in their use.

In the meanwhile the British 1st Division was "quarantined" for "spinal-meningitis" behind barbed wire in an unfrequented area of sand and dune behind Dunkerque. A replica of the beach and seawall was built and the division undertook its training for the landing. One of their most difficult problems was how to get tanks over the sea wall, but this was finally solved by the means of inclined ways pushed ahead of them and wooden rafts placed ahead of the pontoons to fill in.

The division was to be embarked in three brigade columns, one per pontoon, each column including approximately the following:-

- 1. Brigade headquarters
- 4. Battalions Infantry
 - 1. Composite Battery FA. (4 guns, 2 howitzers)
 - 1. Trench mortar battery.
 - 2. Machine gun Companies. (one motorcycle)
- Tanks Detachment -3-tanks.
- Engineer Detachment
- Signal Detachment
- Cyclist Battalion
- Service troops and some transport.

Average strength 175 officers, 4275 men. Division

headquarters was in the left column. Total strength 557 officers, 13193 men.

The monitors were to tow the pontoons to Dunkerque at the last moment, embark the troops and proceed up the coast, covered by a destroyer force and escorted by additional monitors and motor launches. The landing was to take place at daylight on a day selected when high tide came at that time. The main features of the actual landing as planned were:-

(1) A heavy smoke screen laid by the launches to completely cover the ships as well as water areas east of the point selected; the German batteries could therefore see nothing to fire at nor tell what was coming until within a few months of the actual landing: in short, surprise.

(2) An elaborate system of marking buoys laid by the launches to guide the monitors with the ~~pontoons~~.

(3) A heavy bombardment of the defense by all the monitors and the guns in the Nieuport sector particularly against the batteries of the Ostende groupment.

(4) The attack of the Fourth Army from the Nieuport bridgehead at the same time to join up. (54)

On July 8, the British XV Corps had taken over the Nieuport sector from the French as a preparatory measure. The Allies held here a small bridgehead on the right bank

(54) Bacon 185-203.

of the Yser. It had been held by the French for three years without attack. On July 10, elements of the 3rd Naval Division, forewarned by the capture of British prisoners in a raid, attacked and wiped out the bridge-head . The Germans had been fully alerted by increased activity behind the lines, and the Ypres operations further south, and the entire Naval Corps was present, the 3rd Division being in the Lombartzyde sector.(55)

The British plan was never put into operation. July and August passed with the British Army held up on Passchendaele ridge and the advance never reached Roulers. The operation was postponed until October but the unseasonable weather of that year prevented a further British advance and on October 15, the plan was abandoned and the 1st British Division withdrawn from Dunkerque.(56)

What the result would have been, had the British attempted this plan for a landing, is of course pure conjecture. It was daring, well planned, had a large element of tactical surprises and combined with the offensive from Nieuport and further south might have succeeded. On the other hand, the Nieuport bridgehead was gone, maneuver space was greatly restricted for an attack along the coast and the landing would have been made directly at the mass of the Naval Corps, against

(55) DE I 354-56. Scheer 574. HGD 49-71-87.

(56) Bacon 204. DE I 364.

an extremely strong position and directly under the fire of some 10 or 11 coast batteries which would have rendered the water areas employed untenable within a few minutes of the landing. It seems doubtful it could have reached even its limited first objective.

THE BLOCKING ATTACKS ON ZEEBRUGGE AND
OSTENDE.

Blocking attacks on Zeebrugge and Ostende had been considered by the British several times but they had always been given up on account of the risks involved, their doubtful success and because it was considered unwise to block ports which it was hoped might be recovered and which would be valuable. However, in December 1917 the failure to secure results by bombardments and the abandonment of the proposed landing on the coast by the army, led the Admiralty to decide on such an attack.(57)

The object was: to block the canal entrances preventing their further use; seal up any submarines or torpedo boats in Bruges; damage the harbor works and defenses; free the Dover patrol for other work and lastly, "relieve the military and economic communications of an intolerable menace."(58)

The defenses of Zeebrugge and Ostende have been described. The harbor is shown in Charts D. and E. .

The Zeebrugge mole requires special comment, as it played an important part in the attack. It was built as a breakwater forming an artificial harbor and consisted of three parts: An iron railway viaduct some 580 yards long and the width of one track connects the shore end

(57) Jellicoe 199-200. ZO 15. BNO V 241.

(58) ZO 25.

with main masonry mole. The mole proper curving to the northeast is 1850 yards long and 80 yards broad. Its seaward face is built up as a parapet 16 feet above the mole surface. Beyond the main mole is the narrow mole extension 260 yards long with a lighthouse on the end. It was itself a small fortress. On the extension was the Mole Battery of 3-105 mm. guns and 3-88 mm. guns commanding the approaches with an unimpeded field of fire. About 150 yards from the end of the mole extension was a wired in position containing two antiaircraft guns and a shelter trench across the mole. Toward land, along the mole were berths for torpedo boats, submarine shelters, and a seaplane base, all with concrete shelters for personnel and material. (59)

The plan of attack as finally adopted called for a simultaneous attack on both harbors.

At Zeebrugge, the old armored cruiser Vindictive, with two ferry boats the Iris and Daffodil, carrying a specially trained storming party of seamen and marines, was to storm and hold the mole until the block ships had passed through. For this purpose the Vindictive was fitted with special armament and an elaborate system of landing stages and grappling irons to secure to and land on the mole. The ferry boats were equipped with grapples and scaling ladders. The Vindictive was to land just west of the mole extension, the primary purpose being to silence the Mole Battery, thus permitting the block ships to pass. (60)

(59) BNO V. 247.

(60) " " 244. Carpenter 77-81.

The three unarmored cruisers, Thetis, Intrepid and Iphigenia were selected as block ships for Zeebrugge. Enough guns were left on the ships to enable them to engage the batteries during their approach, they were fitted with additional steering gear, filled with cement blocks and bags of dry cement, and charges arranged for blowing out their bottoms. The first ship was to enter the canal and sink herself in the lock gate; the two others to sink themselves in the canal entrance. The block ships were to follow the Vindictive at twenty minutes.(61)

Two submarines, loaded with explosive, were designated to blow up the viaduct connecting the mole with the shore, making reinforcement to the mole impossible.(62)

At Ostende, two more unarmored cruisers, the Sirius and Brilliant, equipped as those detailed to Zeebrugge, were to sink themselves in the harbor entrance. No diversion, as the mole attack, was possible for Ostende.(63)

The whole attack was to be preceded by an aerial bombardment and an hours bombardment of the coast batteries by the monitor force. Similar bombardments and attacks by coastal motor boats were to be delivered during the weeks preceeding the attack, whenever weather permitted, so that the enemy would consider the main attack a routine affair.(64)

During the final bombardment the storming and blocking forces were to approach, covered by an unbroken curtain of smoke over the whole front.

(61) BNO V- 245,248. Carpenter 139.
(62) " " 245.
(63) " " 245.
(64) " " 249.

To allow the block ships sufficient water to maneuver and the storm ships sufficient height to reach the mole parapet, the night selected for the attack had to be one with high tide at the time selected.(65) The smoke screen was vital to success and it was therefore also necessary that the wind be generally north, to blow the smoke into the defenses.(66)

One hundred and sixty five vessels of all classes were assigned the expedition. The personnel for the storming parties, the block ships and for other special purposes amounted to 86 officers and 1698 men.(67)

Attack of April 22-23, 1918.

The necessary details were completed in April and the block ships, storm ships and storming parties assembled at the entrance to the Thames. The other ships to be employed, of the Dover and Harwich forces, were in adjacent ports.(68)

On April 11, the expedition sailed and the bombardment executed. However at 12:45 A.M., when off Zeebrugge, a change in the wind to the south forced Admiral Keyes to turn back as it was impossible to attempt the attack without smoke.(69) When the expedition returned one coastal motor boat was found missing: she had run aground, been captured, and on her, the Germans found some plans of the proposed operation, which caused them to take special measures. The British did not know this at the time.(70)

On April 14, a second attempt was made but given up on

(65) BN0 V 250.

(66) " " 249, 251.

(67) " " " Carpenter 113.

(68) " " " -257. Carpenter 119.

(69) " " 251.

(70) " " 252. Scheer 576.

account of rising sea and wind, although the bombardment was again carried out.(71)

April 22, high water was again at a suitable time, and other conditions favoring, the expedition started. At about 9:00 P.M. Admiral Keyes decided he would attack. As it had started to rain no aerial bombardment was possible but the monitors started theirs at 11:10 P.M. at Ostende and 11:30 P.M. at Zeebrugge.(72)

At the same time that the Zeebrugge bombardment started, the coastal motor boats started the smoke screens and delivered an attack on the mole and harbor. This attack was little noticed by the defenders. The batteries had been alarmed by the bombardment: the heavy batteries took the monitors under a slow and intermittent fire employing sound ranging; while the secondary batteries illuminated the off shore area, but the artificial fog was so dense they could find no targets and their operations were confined to star shell illumination and a defensive barrage.(73)

At 11:50 P.M. the Mole Battery picked up the Vindictive heading for the mole at a range of about 2000 yards. At about the same time the wind shifted to the south and blew the smoke screen toward the attacking forces. The battery immediately opened and kept the Vindictive under fire until she reached the dead angle caused by the curve of the mole where she landed at midnight. The Vindictive was under the fire of the Mole Battery for about 10 minutes and had

(71) BNO V. 252. Scheer 576.

(72) " " 254. " "

(73) " " -255. Scheer 577.

Note: British time is used throughout- German time was 1 hour later- Both British and German accounts agree as to time.

engaged with all her armament but she suffered badly. The four senior officers of the storming party and many men were killed or wounded, part of her armament and all her flamethrowers put out of action and their crew killed or wounded. Twelve of her fourteen landing stages were put out of action and she was seriously damaged in her upper works.(74)

The Vindictive assisted by the Daffodil, which with the Iris had followed her in, made fast to the mole some 300 yards to the westward of the battery defenses and of her intended position.(See Chart D.) The Iris attempted to secure further west but failed and finally went alongside the Vindictive. Few of the Daffodil or Iris parties ever reached the mole or got on the Vindictive. As soon as the Vindictive was alongside as many of her storming party as possible were landed on the mole, covered by her machine guns. They attempted to move toward the battery and westward. They succeeded in securing the ship to the mole and forming a small bridgehead but every effort to advance was broken up by a detachment of 20 men from the Mole Battery, some miscellaneous detachments and the crew of the German Torpedo boat V-69 lying inside the mole opposite the landing place. At the same time the antiaircraft guns on the mole and one gun from the V-69 kept up a heavy fire silencing the machine guns in the Vindictive's top, inflicting many casualties and much damage on her. Finally at about 12:40, having seen the block ships pass in, she withdrew with her consorts.(75)

Of some 900 men in the storming force, it is impossible

(74) BNO V. 256. Carpenter 178-183. Scheer 577-78.

(75) " " " 259. " 579-80.

to tell how many men actually got on the mole, probably not over 100. The German garrison on the mole, at the time consisted of 60 men in the Mole Battery, 70 men in the Harbor Company, the crew of the V-69, and some 200 men of the Naval Air Station who were not engaged, being near the other end of the mole. The shore batteries took no part in the action on the mole because of the fog and the presence of their own people on the mole.(76)

In the meanwhile at about 12:00 M. the leading block ship, the Thetis, came under the fire of the shore batteries and at 12:20 directly under fire of the Mole Battery which opened on her at once. She passed the mole badly damaged, ran into the net defenses, missed the canal entrance, and was sunk in the harbor. She was followed in about ten minutes by the Intrepid and Iphigenia who under a heavy fire from the batteries successfully passed in and were sunk in the canal entrance. The crews remaining alive were rescued by motor boats, who had followed them in.(77)

The submarine C3 accomplished her mission and was blown up under the viaduct about 12:20 A.M., her crew being rescued by motor boats.

During the withdrawal the Vindictive, Daffodil and Iris suffered further damage and many casualties and the destroyer North Star was sunk by a battery. This was at about 1:10 A.M. and may be taken as the end of the action.
(78)

(76) BNO V. 257. Scheer 580.

(77) " " 261. " 581.

(78) " " 263. " " .

Off Ostende the block ships Sirius and Brilliant approached the harbor under a heavy smoke screen but the shift in the wind and the fact that the Germans had moved the buoy off the entrance caused them to lose their way and they grounded east of the entrance where they were sunk under a heavy fire from the batteries.(79)

The British losses in the attack, were one destroyer, two motor launches and 214 killed; 383 wounded and 19 prisoners, of whom 231 were in the Vindictive. The German losses were one barge sunk in the harbor, 10 killed and 16 wounded.(80)

Attack of May 10-11, 1918.

The attack was repeated at Ostende on the night of May 10-11, employing the Vindictive and old cruiser Sappho as block ships. The attack was preceeded and covered by bombardment as before and the Vindictive, the Sappho having broken down, approached the harbor under a smoke screen. After difficulty in finding the entrance, she approached under the fire of several batteries which seriously damaged her and killed her commander at the critical moment. She grounded on the side of the entrance and was sunk in the channel, but not blocking it.(81)

Comments.

The blocking attacks on Zeebrugge and Ostende failed in their primary mission, the blocking of the harbors.

(79) BNO V. 264. Scheer 577.
(80) Carpenter 253. Scheer 283.
(81) BNO V. 270-72. Scheer 584-5.

In spite of statements made at the time and repeated since, Zeebrugge was not blocked.(82) The two ships sunk in the canal entrance, while they restricted its use, did not block it. The locks were undamaged and at high water on April 24, torpedo boats used the canal and April 25, a large submarine. Thereafter movements were normal. Dredging operations were started at once and by May 15 there was a channel of 3.5 meters at low water.(83)

At Ostende, after the first complete failure, the Vindictive was sunk in the canal entrance but parallel to and clear of the channel.(84)

As with the American effort at Santiago in 1898 and the Japanese efforts at Port Arthur in 1904, Ostende and Zeebrugge again demonstrate that blocking attacks are difficult operations, not likely to succeed against fortified harbors.(85)

The attack on the mole was planned primarily to silence the Mole Battery and create a diversion. It failed. The Vindictive, probably because of the punishment she received from the battery, passed it, leaving it free to deal with the block ships. She was so damaged and the defense on the mole so determined that the landing accomplished nothing. As a diversion it failed also because neither the Mole Battery nor the shore batteries paid any attention to the local situation on the mole.

The attack seems to demonstrate that even while raids

(82) Carpenter 249-252. ZO. 17.
(83) BNO. V. 265. Scheer 582. VS. 339.
(84) " " 273. " 585. " "
(85) ZO. 22.

or blocking attacks can be made as a surprise, and pushed home, they have small chance of success against a determined enemy. While the Germans knew something of the proposed attack, from the captured motor boat, and the bombardment had alerted the defense, (86) the actual nature of the assault came as a surprise. Ten minutes after the Vindictive was picked up by the Mole Battery she was alongside the mole, yet her attack failed. Some ten minutes later the first blood ship came under the fire of the batteries and was unable to reach her objective. The last two reached their objective but could not, because of the fire, accomplish their blocking attempt, a difficult operation even without opposition. The entire attack, less the bombardment, from the first appearance of the Vindictive to the sinking of the North Star in the withdrawal, lasted about one hour and twenty minutes. (87) The attack was thoroughly planned and brilliantly and smartly executed. It would seem, in weighing all the factors and considering the advantage of surprise that, if any such attack could succeed, it should have. The defense, particularly the employment of the Mole Battery manned by but 60 men, was most determined and successful.

In commenting on this attack Admiral Scheer, the Commander of the German High Sea Fleet, remarks:

"complete safety from such surprises is impossible of attainment, for it is difficult for those in coastal

(86) Scheer 576-577.

(87) " " -81.

fortifications lying farther back to be in time to overcome ships which come at night through the mist."(88)

The attack also demonstrates the use of smoke to cover an approach. This was an essential part of the plan for without it, surprise would have hardly been possible. It covered the initial dispositions entirely, and prevented the fully effective employment of the batteries. On the other hand, the change in the wind during the attack reacted on the attacker particularly at Ostende.(89) It is a factor which must be reckoned with in future operations.

WITHDRAWAL.

On September 29, 1918 the German Supreme Army Council decided withdrawal from Flanders was necessary. The German Torpedo boats and submarines were returned successfully to their North Sea bases, except a few, not in condition to sail, which were destroyed or interred in Holland. The heavy armament, except the railway batteries which were withdrawn, was destroyed and the Naval Corps and air force turned over to the Army. The coast was reoccupied by the Allies in October 1918.(90)

(88) SR. 340.

(89) BNO. V. 355, 60, 64. Scheer 581.

(90) " " 363. VS. 343-45-46.

CONCLUSIONS.

The Germans occupied the Belgians coast from the Dutch border to Nieuport in October 1914 and retained it until October 1918, when they withdrew.

They instituted measures for its defense as soon as they occupied the coast and continued their development until 1918. For this, there were two main reasons. First, from a naval viewpoint, the coast gave Germany in the harbors of Ostende, Zeebrugge and the connecting harbor of Bruges, advanced naval bases near Great Britains vital military economic communications which made for a substantial improvement in her strategic position. Secondly, from a military viewpoint, the coast being the right flank of the German line on the Western Front, its defense was vital to the security of the flank of the Army.

Coast Defense.

The German dispositions for the defense of the Belgian coast were exceptionally strong and were designed for the positive defense of the occupied sector of the coast.

The harbor defenses (coast artillery) included 37 guns of the primary armament, 33 of which effectively outranged the largest naval guns which could be brought against them, and 70 guns of the secondary armament. They were emplaced to effectively cover all water areas off the coast and to carry out the mission of coast artillery which is to prevent

ingress by naval vessels into the areas covered by the defense.

The beach defense was designed to give an effective cordon defense at the shore line. It was a positive defense to prevent landing or raid and covered the entire sector. The dispositions, as nearly as available information indicates, would seem to have been adequate, well taken, and generally in accord with our accepted doctrines of beach defense as set forth in "Joint Action of the Army and the Navy." Chapter V. Section VII.

Initial Operations.

In the initial operations along the coast, and prior to the establishment of the harbor defenses, the Germans were handicapped by the lack of coast artillery.

Bombardments.

The bombardments conducted against the Belgian coast were carefully planned and methodically executed. They were conducted against the correct objectives, the harbors of Ostende and Zeobrugge and the defenses. While causing temporary damage, no permanent or lasting results were secured. Fire against the defenses was ineffective, while the hazards to the attacking ships were great. A review of all factors leads to the definite conclusion that the bombardment of coastal objectives is productive

of only limited results and is not justified as an independent operation.

Landing Attacks.

While several combined joint operations against the Belgian coast were planned and preparations for one, in the summer of 1917, actually undertaken, none were ever actually carried out.

Blocking Attacks.

The combined blocking attack and assault on Zeebrugge harbor and mole and blocking attacks on Ostende harbor, April 23-24, 1918, were planned and made as surprise attacks for the purpose of effectively blocking the canal entrance in both harbors and preventing their further use as bases.

Brilliantly as the attacks were planned and executed they failed: Zeebrugge and Ostende harbors were not blocked and the attack on the Mole did not accomplish its mission of silencing the Mole Battery and creating a diversion.

The attacks, delivered under cover of smoke, were tactical surprises and at Zeebrugge two of the three block ships and the assaulting ships reached their objectives. Nevertheless the alertness and effectiveness of the defenses so damaged and disorganized the attacking ships that the blocking was unsuccessful and the assault on the mole

completely localized. At Ostende, the first attack failed to reach its objective due, largely, to navigational difficulties. The repetition on May 10-11, 1918, while pushed home, met the same fate as the Zeebrugge attack; it failed.

I think the conclusion is clear. Surprise attacks on coastal harbors at night and under cover of smoke can be made and pushed to their initial objectives. The attacker has every advantage of tactical surprise and complete security is denied the defender. At the same time, I know of no instance where a blocking attack has succeeded against opposition. While there are instances of successful assault, I think the assault on the mole demonstrates that against an adequate defense it has small chance of success.

General

Smoke was extensively employed by both the attack and defense. For both, by reducing the effectiveness of fire, it gave greatly increased protection. For the attack it gave the advantage of a large element of tactical surprise, at the point of the main attack, but a corresponding disadvantage in that its use was dependent on favorable weather conditions which limited operations accordingly.

The German coast defenses on the Belgian coast were of exceptional strength, well manned and fully organized. They fully accomplished their mission in the defense of the coast and in the defense of the German bases of Ostende, Zeebrugge and Bruges. Their effect on the conduct of the war in the North Sea, the submarine war and the war on the Western front reached far beyond the range of their guns.

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TABLE I.A.

NAVAL CORPS.

Organization as of March 15, 1915.

Admiral Von Schroder.

General Headquarters of the Naval Corps- Bruges.

Corps Troops

Naval cyclist detachment	Aviation
Signal Command	Naval Land Flying Sqd.
Telephone detachment	Naval Flying station.
Wireless detachment	Naval Balloon Sqd.
	Naval Airship Sqd.
Searchlight detachment (Austrian)	Engineers
	1st Naval Engineer Co.
	Det. Army Engineers
Bavarian Labor Squadron (1000 men)	Trains
Artillery	Infantry Ammunition
73d Heavy Trench Mortar	Foot Arty Ammunition
175th Med Trench Mortar	Field Arty Ammunition
Battalions.	Light Ammunition.
	Supply Column
	Supply Park

Naval Forces.

Flanders U-Boat Flotilla.) Units assigned by
Flanders Torpedo Boat Flotillas) navy, varied as required.

Harbor Companies

Patrol Forces.

Note: These tables are based on the sources listed below. They are believed to be accurate as far as the combat troops are concerned and in general as to the Corps troops. Owing to discrepancies in the various sources and the difficulties found in translating German conventional signs and abbreviations, however, the details are general.

References: KNS 4. 424. Karte 14.
RQD 49, 71, 86.

Table I.A. Naval Corps. (cont.)

1st Naval Division.

Marine Infantry Brigade.

1st Marine Infantry*

2d Marine Infantry

1st Naval Brigade.

2d Naval Brigade.

1st Matrosen Regiment*

2d Matrosen Regiment

1st Matrosen Artillery**

2d Matrosen Artillery

1st Squadron X Landwehr Cavalry #

1st and 2d Landwehr Field Arty

Battalions. ##

2d Naval Engineer Company

1st Naval Medical Company.

2d Naval Division.

3d Naval Brigade.

4th Naval Brigade.

3d Marine Infantry

4th Matrosen Regiment

3d Matrosen Regiment

5th Matrosen Regiment

3d Squadron IX Landwehr Cavalry

Naval Field Arty Battalion

3d Naval Engineer Company

2d Naval Medical Company.

Notes: * Marine Infantry were regular troops.
Matrosen Regiments were seamen.
Each infantry regiment had 3 battalions
of 4 companies each, a cyclist company,
a machine gun company and a howitzer
company.

** Matrosen Artillery were the coast artillery
troops assigned to the harbor defenses.

Cavalry was attached by the army and appears
to have varied considerably from time
to time.

Field Artillery had 2, 6 gun, batteries
per battalion.

TABLE I.B.

NAVAL CORPS.

Organization as of October 1917.

Admiral Von Schroder.

General Headquarters of the Naval Corps- Bruges.

Corps Troops-Naval Forces.

Generally as in Table I.A, adding 4 squadrons of Landwehr and Landsturm cavalry.

1st Naval Division.

1st Naval Brigade.	Artillery.
1st Matrosen Regiment	1st Matrosen Artillery
2d Matrosen Regiment	258 Landwehr Field Arty.
5th Matrosen Regiment.	(6-4 gun, 3-4 how btry)
41st Cyclist Company.	1st Sqd, 6th Cuirassier Regiment.
1st Naval Pioneer Bn.	
1st, 2d, 3d Pioneer Co's	Signal Detachment.
160th Trench Mortar Co.	Medical Detachment.

2nd Naval Division.

2d Naval Brigade.	Artillery.
3d Matrosen Regiment	2d Matrosen Artillery
4th Matrosen Regiment	Field Artillery ?
4th Marine Infantry.	
Other troops- ?	Signal Detachment
	Medical Detachment.

3rd Naval Division.

4th Naval Brigade.	Artillery.
1st Marine Infantry	Naval Field Arty BN.
2d Marine Infantry	(4-4gun btry.)
3rd Marine Infantry	
	4th Sqd, 19th Ulanen Regt.
Cyclist Company.	
Pioneer Battalion.	
1st, 2d, 3rd Pioneer Co's	
337 Pioneer Co.	Signal Detachment
165th Trench Mortar Co.	Medical Detachment.

References; GF 202-203. H&D 49, 71, 86.

TABLE II.

Principal Batteries- Belgian Coast

No.:	Battery	Range			Remarks	:
		: No Guns	: Caliber mm.	: meters approx		
1	Bremen	4	90	15000		
2	Het Zoute	4	280	27500	Ry guns	
3	Hamburg	4	150	15000		
4	Kaiser Wilhelm II	4	305	37500		
5	Freya	4	210	23000		
6	Kanal	4	88	8000		
7	Friedricksort	4	170	27500		
8	Mole Battery-Zeebrugge	3	105	14000		
		3	88	8000		
9	Wuerttemberg	4	105	14000		
10	Groden	4	280	?	Howitzers	
11	Mittel	4	105	14000		
12	Kaiserin	4	150	15000		
13	Hessen-Donkerklok	4	280	27500	Ry guns	
14	Hertha	4	210	23000		
15	Hannover- de Haan	4	280	27500	Ry guns	
16	Deutschland	4	380	55000		
17	Jacobinessen					
	Preussen- Turkijen	4	280	27500	Ry guns	
18	Irene	4	150	15000		
19	Hindenburg	4	280	16000	Old guns	
20	Friedrick	4	88	8000		
21	Tirpitz	4	280	35000		
22	Cecilie	4	150	17500		
23	Oldenburg	4	170	21000		

Table II. Principal batteries-Belgian Coast.(cont.)

NO.:		: No Guns	:Caliber: mm	Range	Remarks
				meters: approx	
24	Beseler	4	150	15000	
25	Antwerpen	4	105	14000	
26	Aachen	4	150	15000	
27	Lengenboom	1	380	55000	Land tar- gets only.

Note 1. This list is a composite of all sources and lists only the major seacoast batteries as reported by two or more sources. AA and minor batteries were often named and are listed by some; they are not included in this list.

References: MA

Norton 367-369

Schultz 578

Bacon- Chart at end of book.

BNO V- 246-247, Chart 19.

Note 2. Table of English caliber equivalents and number of guns of all calibers emplaced.

mm	Caliber inches	Class	Total emplaced
380	15	Primary	5
305	12		4
280	11		24 guns
			4 howitzers
210	8	Secondary	8
170	6.6		8
150	5.9		24
105	4.1		15
90	3.5		4
88	3.4		11

TABLE III.

DOVER PATROL- Principal ships employed- Belgian Coast.

Old Battleships: Majestic and Revenge (re-named Redoubtable).

4-12" guns, range 16000 yds.

6" guns, range 13000 yds.

Draft too great for coastal work, not much used.

Monitors:

Severn, Humber, Mersey.

2-6" and 2-4.7" Howitzers.

Employed in initial operations

Lord Clive, Prince Eugene, General Wolfe,

Prince Rupert, General Craufurd.

Sir John Moore.

12" guns, range 21000 yds. Used in 1915, 16, 17 and 18.

Marshal Ney, Marshal Soult.

15" guns, range 25000 yds. Came out in 1916. Slow-speed 5 knots. Handled badly at sea due to design.

Erebus, Terror.

15" guns, range 25000 yds, some 6" guns. Speed 14 knots.

M 21 to M 27. incl.

9.2", 6" or 7.5" guns. Single gun ships.

Used to protect larger monitors and for patrol work.

Cruisers:

Attentive, Active, Adventure.

Used for offshore patrol work and with destroyers.

Destroyers:

Some 14 ships, each armed with 2-4" or 4-12pdrs. Used for patrols, offshore and with monitors on coast.

Miscellaneous craft: Motor launches, gunboats, mine sweepers, mine layers, aircraft carrier, various types of patrol vessels. Submarines.

References: Bacon 53-61. BNO I. 99.

TABLE IV.

Principal Bombardments - Ostende - Zeebrugge.

Date of ATTACK.:	SHIP & TARGET	REMARKS
1914		
Nov. 21	Majestic & Revenge Zeebrugge	Fired 400 rounds on defense and locks. Results unknown but small. (1)
Dec. 15	Majestic, Revenge 3 gunboats Harbor defenses	Results- none known. (2)
Dec. 16	Revenge Harbor defenses	Revenge hit twice-badly- and had to be docked. (2)
1915		
Mar. 11	Majestic & Revenge Westende positions	To help Neuve Chappelle offensive by British. Results did not justify expenditure of ammunition (3)
Aug. 23	Clive, Moore, Rupert 10 destroyers miscellaneous craft Zeebrugge- Canal and locks.	Results none. Materiel failures on monitors caused early withdrawal. Range 17500 yds. (4)
Sept. 7	Clive, Crauford, Rupert miscellaneous small craft. 2 gunboats on enemy batteries. Ostende and Dockyard	Results unknown, probably none. Fire of German batteries very accurate. Clive hit 4 times and squadron forced to withdraw. Ranges 18000-19500 yds (5)
Sept. 19	Clive, Ney and various attendant ships. French batteries near Nieuport. Battery Tirpitz and batteries near Raversyde.	To test out the fields of fire of Battery Tirpitz. Battery covered all the channels and followed ships. Ney broke down. No results on batteries. (6)

Date of ATTACK.:	SHIP & TARGET	REMARKS
Sept. 25	Eugene and Crauford attendant ships Coast targets Knocke to Blankenberghe Olive, Ney & Rupert outende, coast and docks.	To assist offensives to the south. East squadron fired 78 rds, west squadron 116. Results on shore unknown. Two attendant ships, one yacht and one drifter sunk by batteries. (7)
Sept. 26 27. Nov & Dec.	Miscellaneous firings on shore batteries and installations.	Results- unknown. (8)
1916 Jan. 26	Five monitors, attendant ships Westende positions.	Air and terrestrial spot- ting developed from exper- ience in previous firing used. Results unknown. Firing stopped for winter and because ships out- ranged by batteries. (9)
Sept; 8-15	Various monitors on Westende positions and Zeebrugge.	As a part of a diversion on the coast to assist British offensive to the south. Reported to have caused movement of reserves to Bruges. (10)
May 12	Terror, Soult, Erebus, Moore, M24, M26, 10 destroyers, 6 mine sweepers, 19 launches. Offshore covering force. Locks of the canal at Zeebrugge which con- trolled water level and destruction of which would stop traffic.	A carefully planned and deliberate bombardment. Two 15 inch hits on lock gates, it had been decided would destroy them. Probabilities of hitting at 25000 yards required 252 rds. Bombardment was to be a sur- prise conducted in early morn- ing under smoke screen. After 3 false starts due to unfavorable weather for smoke attack was made. Air observa- tion protected by fighters employed. Firing began at 6 and ended at 6 AM. 250 rds fired, 45 spotted. Germans attacked in air and with the batteries. 19 shell fell close to locks, no hits. Basin and dockyard slightly damaged. Operation did not succeed. (11)

Date of ATTACK.:	SHIP & TARGET	REMARKS
June 5	Erebus & Terror 6 destroyers 13 patrol boats and launches. Offshore covering force. Ostende dockyard	A general repetition of the Zeebrugge bombardment on Ost- ende but with a much larger target. Weather conditions again caused several delays. Squadron anchored off Ostende at 3 AM and set up smoke screen. Bombardment started at day- light and continued from 3:30 to 4. Batteries replied at once and kept up a steady and accurate fire but did no damage 115 rds fired on Ostende, about 20 exploded in and around dockyard. Damage serious in yard. Owing to difficulties of operation however bombard- ment could not be repeated often enough to secure last- ing results. (12)
Aug 21)	
Sept 22)	
Sept 25)Repetition	
Oct 19,28)	

References:

- (1) BNO II-12.
- (2) BNC II-20.
- (3) BNO II-202.
- (4) BNO III-150, Bacon-100, KNS 4-308.
- (5) BNO III-151, Bacon-101-102, KNS 4-314.
- (6) BNO III-152,
- (7) Ibid, Bacon-102.
- (8) Bacon-103.
- (9) Bacon-103-104.
- (10) Bacon-105.
- (11) Bacon-106-108, BNO V-36-41.
- (12) Bacon-109-110, BNO V-45-48.